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ABSTRACT

As the number of microcomputers in schools increases, it becomes more important for staff to provide opportunities for student use. When viewed as an innovation, student use of computers in schools can be susceptible to the same implementation problems as any innovation. Attitude is one factor that can influence success of implementation. In order to address the problem of underuse of computers in the classroom, this study re-visits the issue of the effect of gender and experience on computer attitudes. The Computer Attitude Scale (CAS) was administered to 289 teachers (91 male, 192 female) enrolled in graduate education courses at a large southwestern university. In general, the results suggested that the respondents had fairly positive attitudes. The results supported previous research indicating that experience is a differentiating factor but did not support the theory that gender affects attitudes toward computers. (Contains four tables and eight references.) (LH)

Computer Attitudes Among Professional Educators: The Role of Gender and Experience

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Introduction

As the number of microcomputers in schools continues to increase, it becomes increasingly important for school staffs to provide opportunities for students to utilize them properly. When viewed as an innovation, computers in schools are susceptible to the same implementation pitfalls as are any other innovation. It has been suggested that the attitudes of individuals proximate to the implementation of an innovation can influence the innovation's success (Rice and Aydin, 1991). Further, attitudes are thought to influence behavior. As such, there is great interest in understanding the attitudes of educators toward computers. Past research has focused on issues of gender and prior computer use to explain attitudinal differences. The purpose of this study is to re-visit these issues. The results partially support previous findings in areas related to computer experience, but contradict findings related to gender.

Perspective

Attitude

It has been suggested that the attitudes of individuals proximate to the implementation of an innovation can influence the innovation's success (Rice & Aydin,1991). Further, attitudes are thought to influence behavior. A method of addressing underuse of computers in the classroom is to encourage teachers to integrate them into their teaching. Programs such as these may take place at the post-secondary level or at the district level. Evaluation of these programs generally involves assessment of attitudes. The Computer Attitude Scale (CAS) is one such measure, used extensively across several population groups (Loyd and Gressard, 1984a).

Loyd and Gressard (1984a) reported that the Computer Attitude Scale (CAS) is an effective and reliable measure of attitudes toward learning about and using computers. The CAS is a Likert-type instrument consisting originally of thirty items (later expanded to forty items) which present statements of attitudes toward computers and the use of computers. Loyd and Gressard (1984a) concluded in a confirmatory factor analysis that the CAS consisted of four subscales: (a) anxiety or fear of computers; (b) liking of computers; (c) confidence in computers; and (d) computer usefulness.

The Role of Gender and Experience

Studies of gender differences in computer attitude have yielded mixed results; three studies in particular provide context for the present investigation. In a 1986 study, Loyd and Gressard examined the attitudes of 112 elementary, junior high, and high school teachers from three school systems in Virginia. Teachers were administered the CAS and asked to provide information regarding gender and amount of computer experience. Loyd and Gressard derived an experience values that ranged from (a) none, (b) less than six months, (c) six months to one year, and (d) more than one year. In general, the teachers as a whole had fairly positive attitudes toward computers. Loyd and Gressard found main effects for gender and experience on computer anxiety. Teachers with more that one year of experience were significantly less anxious. Also, males were less anxious than females.

Pope-Davis and Twing (1991) studied the effects of age, gender, and experience on attitudes toward computers. These researchers administered the CAS to a sample of 207 students enrolled in an introductory computer skills course in the college of education at a major university. Building upon earlier work of Loyd and Gressard (1984a), Pope-Davis and Twing sought to improve upon the measures of computer experience utilized by Loyd and Gressard. It seems that in 1984 Loyd and Gressard measured computer experience in terms of weeks, perhaps concealing information regarding long-time users of computers. Unfortunately, Pope-Davis and Twing do not indicate their measure for computer use and experience. In spite of this omission, Pope-Davis and Twing reported no significant age or experience effects on computer anxiety, but significant age effects on computer confidence, with older subjects exhibiting more confidence toward computers. Furthermore, these researchers found that the older the age group, and the greater the computer experience, the

more computer liking. Finally, no effects were found using computer usefulness as the dependent measure. In sum, Pope-Davis and Twing concluded that age was not an unequivocal determinate of attitude, nor is experience. Gender did not play a role in determining differences in attitude either, which was consistent with Loyd and Gressard (1984).

Busch (1995) also used the CAS on 146 undergraduate students of business administration who were enrolled in a compulsory computer course in a Norwegian college. Curiously, Busch used the thirty item, three subscale version of the instrument. To measure experience, subjects were asked to indicate to what extent they had worked with word processing, spreadsheet programs, programming, or computer games before college. Males had significantly less anxiety and higher confidence than females, however there was no gender difference as to computer liking. Prior computer experience coupled with encouragement had the largest effect on computer attitudes. Busch concludes that "the most important predictor of computer attitudes is previous computer experience and encouragement."

In the present study we seek to re-visit the gender issue and also examine experience as an independent variable which may affect attitude. In this study, experience has been quantified by subjects' reports of frequency of use of computers in both the home and at work.

Method

Sample

Data were collected from 289 educators (mostly certified teachers) enrolled in graduate education courses at a large southwestern university. Ninety-one were male, 192 were female and twelve did not indicate their gender.

Instrument

Subjects were administered the forty item Computer Attitude Scale (Loyd and Gressard, 1984), which present statements of attitudes toward computers and their use. The scale yields five indices: one for each subscale and a total score. Original coefficient alphas have been reported by the Loyd and Gressard as .86, .91 and .91 for the anxiety, confidence, and liking subscales, respectively; the alpha for the total scale was .95. Subsequent studies have yielded similarly high internal consistency scores.

Respondents were asked whether they engaged in six different computer related activities at home and the frequency with which they engaged in those tasks. Responses were recorded, using a 5-point Likert scale, as follows: never, occasionally in a year, once a month, once a week, daily. The tasks were as follows: program a computer, access the Internet, word processing, retrieve/compose electronic mail, paint/draw/other graphics, and spreadsheet/numerical/statistical analysis. Respondents were also asked the degree to which they do these things at their workplace. A home use/frequency index and workplace use/frequency index were created by summing the frequency scores for each of the activities. Respondents were also asked to indicate whether they owned a computer and to report their gender.

Procedures

Subjects in the present study were administered the CAS during regular class time within the first week of the semester. The data were analyzed using SPSS for Macintosh, and subjected to descriptive statistics and independent-measures t-tests.

Results

The mean for the CAS was calculated as162.89, with a standard deviation of 24.06. As Table 1 indicates, the sample held generally favorable attitudes toward computers in terms of computer anxiety, confidence, liking and usefulness.

Table 1. Subscale scores for the CAS

Variable	Mean	Std Dev
Anxiety	41.63	7.05
Confidence	41.19	6.45
Liking	40.02	7.56
Usefulness	43.17	4.75

As to the gender issue, independent- measure t tests revealed no significant differences on the CAS $t(180)=.87$ $p=.388$, or any of its subscales.

Responses regarding computer experience were summed such that higher sums indicated greater frequency of use (lowest possible score = 6; highest possible score = 30). Groups of users defined as "high" and "low" were derived by selecting subjects whose frequency of use sum was ± .5 standard deviations from the mean frequency of use. Based on this derivation, sixty subjects were determined to be high work users and sixty-seven subjects were determined to be low work users. The mean score for computer usage at work was 15.53, sd = 5.93. As shown in Table 2, the intensity of computer use at work significantly affected the samples attitude towards computers on all four subscales of the CAS.

Table 2. Differences in Attitude Based on Frequency of Computer Use at Work

Variable	work-high (n=60)	work-low (n=67)	
Anxiety	44.37	35.86	t(117.97) 7.16 p=.000*
Confidence	44.19	36.17	t(120.79) 7.94 p=.000
Liking	42.85	35	t(123) 6.32 p=.000
Usefulness	45.24	41.16	t(124) 5.20 p=.000
Total Scale	176.6	147.27	t(121) 7.64 p=.000

*variances unequal

Home computer usage was first examined by using computer-ownership as an independent variable. Table 3 provides the mean CAS scores for owners (n = 188) and non-owners (n = 55). Independent t tests revealed that home computer-ownership was a statistically significant variable.

Table 3. Average CAS Scores Based on Computer Ownership

Variable	Own	Don't Own	
Anxiety	42.08	38.64	t(238) 3.15 p=.002
Confidence	41.54	38.67	t(239) 2.86 p=.005
Liking	40.22	37.05	t(239) 2.79 p=.006
Usefulness	43.70	41.55	t(183) 2.66 p=.008
Total Scale	165.43	155.48	t(85.52) 2.65 p=.009*

*variances unequal

Further, fifty-six subjects were determined to be high home users and forty-nine subjects were determined to be low home users. The mean score for computer usage at home was 18.40, sd = 7.05. Frequency of use in the home has a significant effect on overall attitude, and significant effects on one's anxiety, confidence, liking, and perceived usefulness of computers (see Table 4).

Table 4. Differences in Attitude Based on Frequency of Computer Use at Home

Variable	Home-high (n=56)	home-low (n=49)	
Anxiety	44.91	34.94	t(90.60) 7.77 p=.000*
Confidence	44.98	35.49	t(86.98) 8.93 p=.000*
Liking	43.75	34	t(102) 7.34 p=.000
Usefulness	45.80	40.29	t(103) 6.41 p=.000
Total Scale	179.38	144.44	t(101) 8.68 p=.000

*variances unequal

Conclusions

In general, the results suggest that the respondents had fairly positive attitudes toward computers. This study does not support the notion that there are gender effects on attitude toward computers. This supports previous research of Loyd and Gressard (1984b) and Koohang (1989) and Pope-Davis and Twing (1991), but contradicts subsequent work by Loyd and Gressard (1986) and Busch (1995). This study, therefore, contributes to the mounting body of conflicting evidence regarding gender influences on attitude towards computers. Kay (1992) reports that of ninety-eight instances of attitude measurement, researchers have found that males have more positive attitudes on forty-eight occasions; on fourteen occasions, females had more positive attitudes; whilst on thirty-six occasions, both males and females had similar attitudes. It is apparent that further research must address the issue of gender, however, future studies should be contextual in nature.

The results regarding experience are much more clear. In the present investigation, experience with computers was defined through frequency of use. In all aspects of attitude, as measured by the CAS, experience was a differentiating factor in one's attitude toward computers. Pope-Davis and Twing (1991) did not find this to be the case; however, our results are consistent with Busch's (1995) findings and with those of Loyd and Gressard (1986). It appears that the case for experience with, and use of, computers as a determinate of attitude toward computers is becoming stronger, even in settings outside the United States. Recent findings (Nash & Flores Balbuena, 1997) suggest that children in Mexico who report their parents use a computer have higher confidence and perceive computers as more useful than students who report their parents do not use computers. This was not the case when students reported their parents owned a computer. In spite of the fact that the Mexican sample consisted of children, the results support the notion that use, not mere presence, of a computer has a strong effect on attitude toward computers.

In an era where the use of computers is ever increasing, especially in graduate programs of education, results such as these can provide useful information to program developers and professors who use computers as part of their curriculum. A question for further study is how attitudes change over time when computers are part of the graduate school curriculum. What is the relationship of attitude and exposure over sixteen weeks to individuals with relatively low attitude? Does coursework and ancillary computer laboratory activities improve attitude toward computers? The answers to these questions remain to be seen.

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